Maryland
319 Nonpoint Source Program
2011 Annual Report

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Preface

The report is produced by the Maryland Department of the Environment to meet a grant condition that appears in each annual 319(h) Grant award to Maryland from the US Environmental Protection Agency. This programmatic condition in the FFY11 award states:

> The report shall contain the following:
>
> a. A brief summary of progress in meeting the schedule of milestones in the approved Management Program, and,
>
> b. Reductions in nonpoint source pollutant loading and improvements in water quality that has resulted from implementation of the Management Program.
>
> c. Descriptions of priority Watershed Based Plan accomplishments. Accomplishments should be based the implementation milestone goals/objectives as identified in each priority plan. The goal information can be displayed in the form of a watershed goal/accomplishment chart showing percent achieved, supplemented by a short narrative that should give the reader a clear understanding of the actions being taken and the outputs and outcomes which are occurring from the actions. If monitoring was completed, a summary of that information should also be included. For example, if 1000 feet of streambank stabilization was completed, then how does that compare to the needs identified in the watershed based plan i.e. what percent of streambank stabilization was completed compared to the overall needs as identified by the plan. Similar comparisons should also be provided for each significant pollutant load reduction.

What is Nonpoint Source Pollution?

Nonpoint source (NPS) pollution is defined as polluted stormwater runoff caused associated with rainfall, snowmelt or irrigation water moving over and through the ground. As this water moves, it picks up and carries pollutants with it, such as sediments, nutrients, toxics, and pathogens. These pollutants eventually reach lakes, rivers, wetlands, coastal waters, ground waters and, most of the time in Maryland, the Chesapeake Bay.

NPS pollution is associated with a variety of activities on the land including farming, logging, mining, urban/construction runoff, onsite sewage systems, streambank degradation, shore erosion and others. For example, stormwater flowing off the land carries the nutrients nitrogen and phosphorus into local streams and eventually into the Chesapeake Bay. Under natural conditions, this is beneficial up to a point. However, if excessive nutrients enter a lake or the Chesapeake Bay, and cause nuisance algae blooms, then these nutrients are deemed pollutants.

The pollution contributed by nonpoint sources is the main reason why many of Maryland's waters are considered "impaired." Impaired waters are those waters that do not meet Water Quality Standards for designated uses (e.g., fishing, swimming, drinking water, shellfish harvesting, etc.). The most recent Chesapeake Bay model associates nonpoint source pollution into several land use categories as shown in Figures 1 and 2. The figures also show that the relative amount of nitrogen and phosphorus generated by the different land uses in Maryland varies significantly.

I. Executive Summary

This report documents the activities and accomplishments of the State of Maryland in general and in particular management of the State's 319 NPS Program, including administration of the Federal §319(h) Grant, by the Maryland Department of Environment (MDE). MDE plays a lead role in helping to achieve protection and improvement of Maryland's water quality by promoting and funding state and local water quality monitoring, stream and wetland restoration, education and outreach, and other measures to reduce and track nonpoint source pollution loads.

MDE is the lead agency responsible for coordination of policies, funds, and cooperative agreements with state agencies and local governments. Several other state agencies have key responsibilities, including the Maryland Department of Natural Resources (DNR), Maryland Department of Agriculture (MDA), and Maryland Department of Planning (MDP). The NPS Program is housed within MDE's Science Services Administration (SSA). During the past 22 years, Maryland has received over $46.5 million through the 319(h) Grant. (See Appendix A)

In calendar year 2011, there have been notable successes and accomplishments:

- Projects funded by 319(h) Grant that were completed during calendar year (Table 2) reported implementing best management practices resulting in pollutant load reductions: nitrogen 53,970 pounds/year; phosphorus 853 pounds/year; sediment 7.7 tons/year; acid 61.6 tons/year; iron 7.5 tons/year, and; aluminum 4/7 tons/year.
- Nine watershed plans in Maryland, including the Casselman River watershed plan completed in 2011, have been accepted by EPA. The Lower Monocacy River watershed plan by Frederick County was recognized by EPA as one of the best plans in the nation. Implementation to meet plan goals and objectives is completed for one plan and progress toward implementing the other eight plans is reported in this Annual Report.
- Implementation progress reported for the nine EPA-accepted watershed plans included significant overall total pollutant load reductions. For these watersheds, counting from the time of watershed plan acceptance through the end of 2011 including all reported projects regardless of funding source, the following overall cumulative pollutant load reductions were reported: 755,645 lbs/yr nitrogen; 74,222 lbs/yr phosphorus, and; 756 tons/yr sediment.

The Program continues to face several challenges and concerns. Because of increasing development, there has been in an increase in the urban/suburban component of nonpoint source pollution. Funding to the 319(h) Grant nationally was cut significantly for Federal Fiscal Year (FFY) 2011 compared the recent FFYs. Additionally, other federal and state budgets are continuing to decrease, which leads to an ever-tightening restraint on the amount of help, either technical or financial, that is available. There is also the need to show effectiveness or environmental results in an area that may take years or decades to do so.

II. Mission and Goals of the NPS Program

Maryland's mission is to implement effective nonpoint source pollution control programs. These programs are designed to achieve and maintain beneficial uses of water, improve and protect habitat for living resources, and protect public health through a mixture of water quality and/or technology based programs including: regulatory and/or non-regulatory programs; and financial, technical, and educational assistance programs.

Through leadership and financial support Maryland's Section §319(h) Nonpoint Source (NPS) Program plays a lead role in helping to achieve protection and improvement of Maryland's water quality. The Program promotes and funds state and local watershed planning efforts, implementation of NPS projects consistent with watershed plans, water quality monitoring, stream and wetland restoration, education and outreach, and other measures to reduce, prevent and track nonpoint source pollution loads. The NPS Program plays a key role in promoting partnerships and inter- and intra-governmental coordination to reduce nonpoint sources of pollution, and helps bring the necessary technical and financial resources to local watershed management planning, best management practices, and restoration of streams and wetland habitats. Program partners include State agencies, local government (counties, municipalities, Soil Conservation Districts), private landowners and watershed associations.

The NPS Program's three priority goals for funding of implementation projects through the 319(h) Grant are (FFY2012 RFP):

GOAL 1	To support meeting Total Maximum Daily Load (TMDL) nonpoint source reduction targets.
GOAL 2	To significantly contribute to reducing one or more nonpoint source water quality impairments in a water body identified in Maryland's 303(d) list of impaired water bodies leading toward full or partial restoration.
GOAL 3	To implement projects from EPA-accepted watershed-based plans that will produce measurable nonpoint source pollutant load reduction consistent with Goals 1 and 2.

III. Overview

Maryland surface waters flow into three major drainage areas:

- The Chesapeake Bay watershed receives runoff from of Maryland's mid section and encompasses about 90% of the State.
- Maryland's Coastal Bays receives runoff from Maryland's east side.
- The Youghiogeny River, which is part of the Ohio and Mississippi Rivers drainage, receives runoff from Maryland's west side.

Historically, the Program's policy has been to maintain an active presence in all three major drainage areas. The mix of 319(h) Grant-funded projects during 2011 reflects this policy. In Western Maryland where acidic mine drainage impairs local waterways, the 319 Program has invested in two watersheds: Aaron Run and Casselman River. On Maryland's Eastern Shore, there were no active projects in the Coastal Bays drainage. However, the 319 Program continued to provide assistance in several watersheds including the Corsica River watershed. In the central

part of the State, the 319 Program helped to support projects in several watersheds including: Lower Monocacy River and Back River.

Overall, Maryland has over 9,940 miles of non-tidal streams and rivers. Maryland's water resources provide food and water for its residents, jobs for the economy and a place where people may relax and enjoy the natural environment. Maryland's water resources are under stress from a variety of causes, with nonpoint source pollution the greatest single factor.

Maryland's rich heritage and the bounty of its waters are threatened by the very prosperity that continues to draw newcomers. Recreation, tourism, commercial and recreational fishing, wildlife habitats, and our quality of life are ultimately dependant upon healthy watersheds. Yet, the state's waters are increasingly impacted by and remain impaired due largely to nonpoint sources of pollution and related habitat degradation due to altered land uses.

Addressing Nonpoint Source Pollution

Many agencies and programs in Maryland, including State agencies, Counties, Soil Conservation Districts and municipalities, have responsibilities in managing NPS pollutant. Contacts for key State agency programs with NPS management responsibility are listed in Appendix B.

The best methods for controlling NPS pollution are frequently called Best Management Practices (BMPs). These BMPs are designed to meet specific needs, like grassed buffers to control sediment and phosphorus that could leave farm fields, or wet stormwater ponds to capture sediment and nutrients in urban runoff. Every year, Maryland generates a cumulative total of BMPs implemented in the State. The most recent findings through 2010 are summarized in Appendix C.

A wide array of approaches and programs help to prevent, reduce or eliminate pollution from nonpoint sources. The general approach employed in Maryland to manage NPS pollution is summarized in Appendix D.

Demonstrating success in achieving nonpoint source management goals and objectives is an important focus for the program. Each year, at least one success story is submitted to EPA. Appendix E presents the most recent success story.

In 2011, EPA completed a national review of watershed plans and determined that Frederick County's Lower Monocacy River watershed plan was among the best in the country. Appendix F presents a copy of EPA's report.

Figure 1. 2010 Total Nitrogen Sources in Maryland

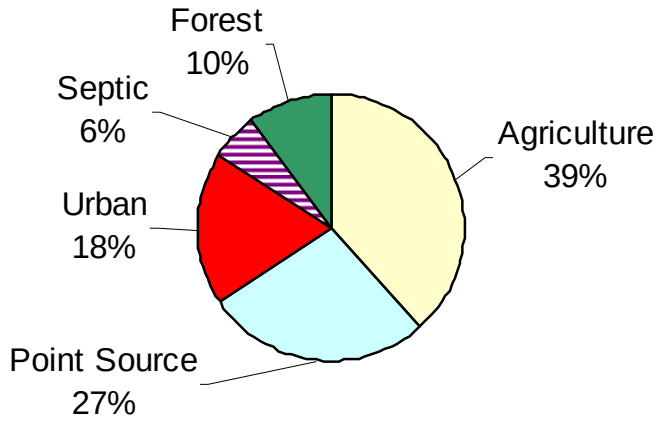
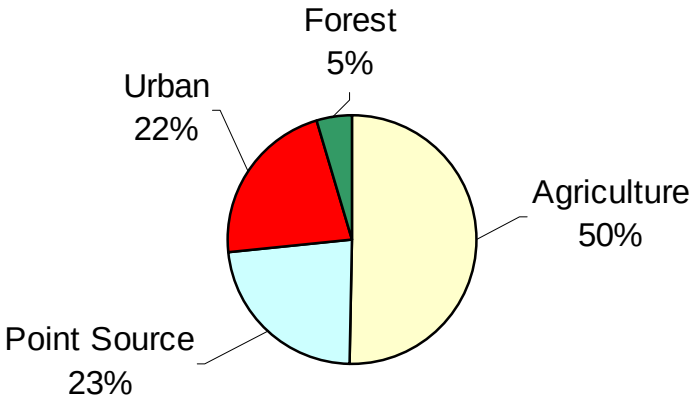


Figure 2. 2010 Total Phosphorus Sources in Maryland



* Data referenced from the Phase 5.3.2 Chesapeake Bay Model 2010 Progress Delivered loads using Constant Delivery Factors. The reported statistics include all of Maryland lands within the Chesapeake Bay Watershed except atmospheric deposition the main body of the Bay.

IV. Accomplishments, Successes and Progress

In the past year, there have been notable program accomplishments, successes and challenges. Progress was made in implementing best management practices in all nonpoint source areas through the provision of technical assistance, project funding or both.

A. Active 319(h) Grant-Funded Projects and Project Outcomes

During calendar year 2011, 26 projects in Maryland were reimbursed using the Federal 319(h) Grant. The geographic area encompassed by this implementation and planning activity is shown in Figure 3.

The status of all 26 projects that were active during 2011 is summarized in Table 2.
- 13 projects include on-the-ground implementation,
- 9 projects include either monitoring or tracking of implementation progress/results and
- 5 projects include planning in preparation for implementation.

Among these 26 projects, eight completed in 2011 produced the overall estimated outcomes in the adjacent table. More details on the completed project results are in Table 3.

Table 1. Aggregate Pollutant Reductions Reported By 319(h) Grant Projects Completed During 2011

Acid Mine Drainage Mitigation			Nutrient/Sediment Controls		
Acid	61.6	Tons	Nitrogen	53,970	Pounds
Iron	7.5	Tons	Phosphorus	853	Pounds
Aluminum	4.7	Tons	Sediment	7.7	Tons

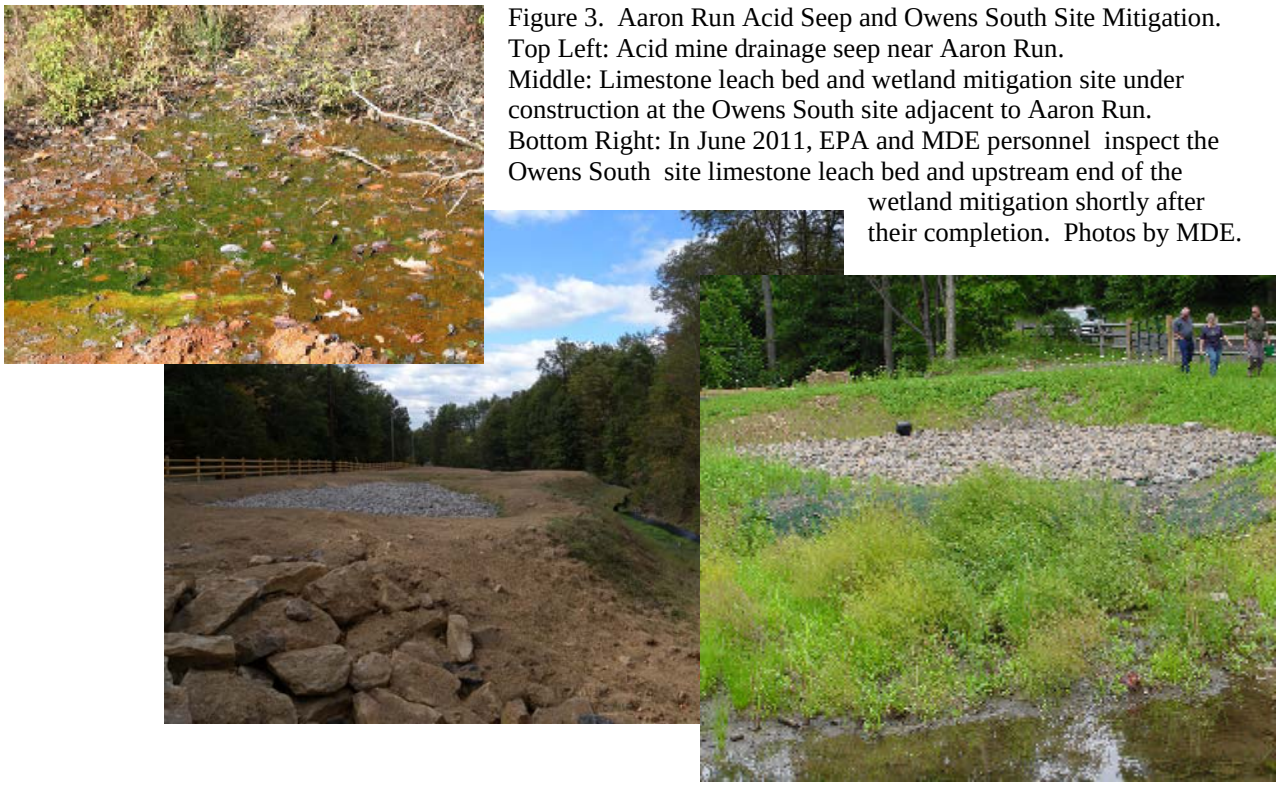
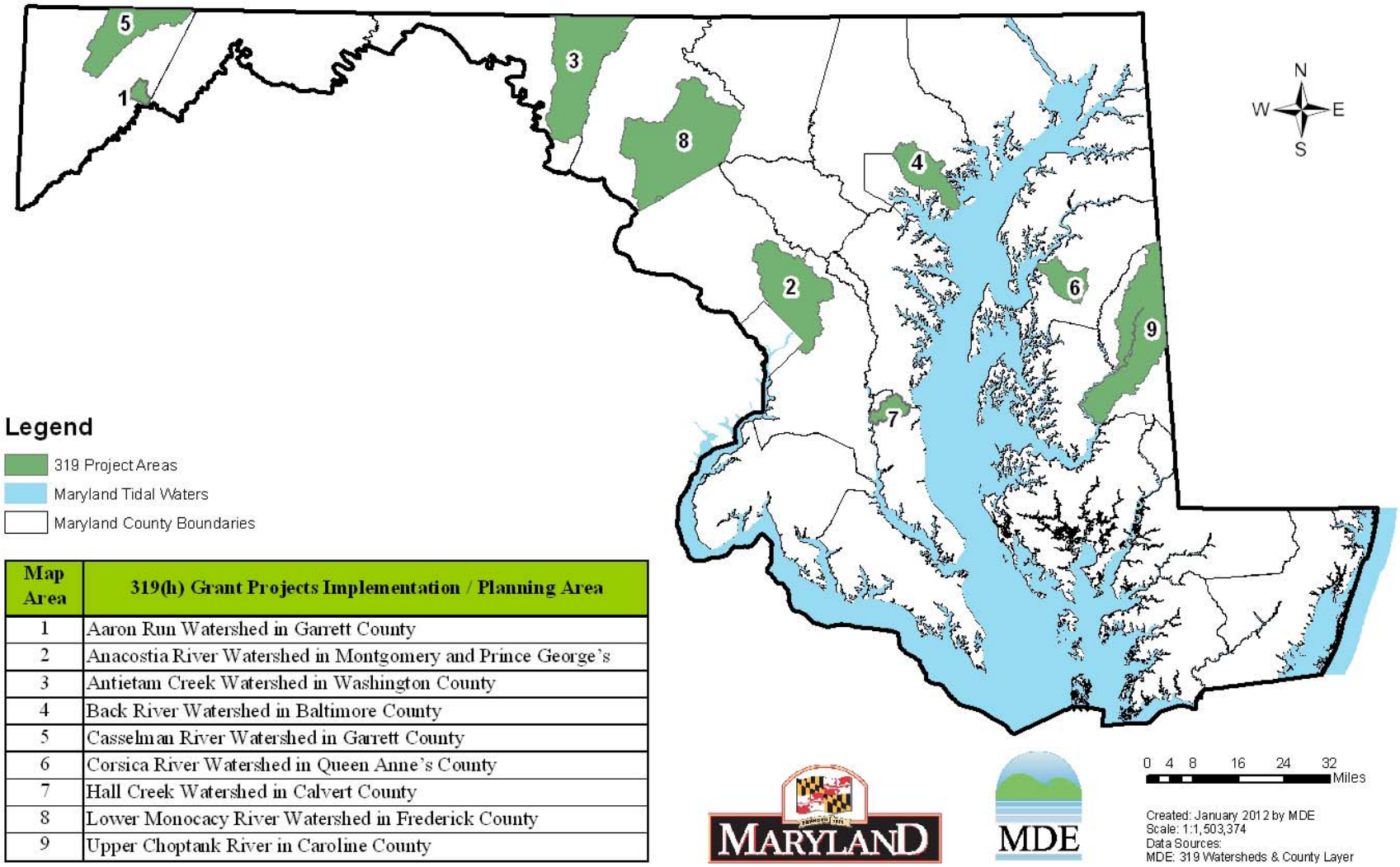


Figure 3. Aaron Run Acid Seep and Owens South Site Mitigation.
Top Left: Acid mine drainage seep near Aaron Run.
Middle: Limestone leach bed and wetland mitigation site under construction at the Owens South site adjacent to Aaron Run.
Bottom Right: In June 2011, EPA and MDE personnel inspect the Owens South site limestone leach bed and upstream end of the wetland mitigation shortly after their completion. Photos by MDE.

Figure 4
Map of Maryland Implementation and Planning Project Areas
Funded by the 319(h) Grant in 2011



Map Area	319(h) Grant Projects Implementation / Planning Area
1	Aaron Run Watershed in Garrett County
2	Anacostia River Watershed in Montgomery and Prince George's
3	Antietam Creek Watershed in Washington County
4	Back River Watershed in Baltimore County
5	Casselman River Watershed in Garrett County
6	Corsica River Watershed in Queen Anne's County
7	Hall Creek Watershed in Calvert County
8	Lower Monocacy River Watershed in Frederick County
9	Upper Choptank River in Caroline County

TABLE 2. Active Projects In Calendar Year 2011 Using Federal 319(h) Grant Funds

Map Area	Watershed Name (Md 8-Digit #)	TMDL or WQA	Impairment *	Project Name (Lead Agency, Grant Year)	Status
1	Aaron Run Watershed (Savage River tributary) 02141006	Low pH, Nutrients	Low pH, Methylmercury-fish tissue	Acid Mine Drainage Remediation (MDE: FFY05 #19, FFY06 #1, FFY07 #12)	Project start Oct. 2005 Completed 2011
2	Anacostia River 02140205	Bacteria, PCBs, Sediment, Nutrients, Trash	Bioassessment, Fecal Coliform, Heptachlor Epoxide, Nitrogen, PCBs, Phosphorus, Total Suspended Solids, Trash	Green Streets – Green Jobs Partnership (Chesapeake Bay Trust FFY10 #12)	Project start 2010 Anticipate completion 2012
3	Antietam Creek 02140502	Bacteria, BOD, Sediment	Bioassessment, Fecal Coliform, PCB in fish tissue, Phosphorus, Total Suspended Solids	Watershed Plan (Washington SCD FFY08 #20)	Project start July 2010 Anticipate completion 2012
4	Back River 02130901	Bacteria, Chlordane, Nutrients, PCBs, Zinc	Bioassessment, Fecal Coliform, Nitrogen, Phosphorus PCB in fish tissue, Total Suspended Solids	Redhouse Run at St. Patrick Stream Restoration (Baltimore Co. FFY07 #18)	Project start 2009 Completed 2011
				Stormwater Conversions (Baltimore Co. FFY08 #21)	Project start 2011 Anticipate completion 2012
				Bread and Cheese Creek Restoration (Baltimore Co. FFY10 #11)	Project start 2011 Anticipate completion 2013
5	Casselman River (Youghioghy River trib.) 05020204	pH, WQA Nutrients	Low pH, Methylmercury –fish tissue	Watershed Plan (MDE FFY08 #12)	Project start July 2008 Completed 2011
				Acid Mine Drainage Remediation Implementation (MDE FFY09 #6)	Project start July 2008 Anticipate completion 2013
6	Corsica River (Chester River tributary) 02130507	Bacteria, PCBs, Nutrients	Estuarine Bioassessment, Nitrogen, Phosphorus, Fecal Coliform, PCB in fish tissue, Total Suspended Solids	Bioretention Swale (Queen Anne's County FFY08 #19)	Project start July 2008 Completed 2011
				Capacity / Implementation (Centreville FFY09 #1)	Project start April 2006 Anticipate completion 2012
				Ag. Technical Assistance (MDA / Queen Anne's SCD FFY10 #10)	Multi Year/Grant Project
				Monitoring Urban Stormwater and On-Site Domestic Systems (MDE FFY10 #2, FFY11 #2)	Multi Year/Grant Project
7	Hall Creek Watershed (L. Patuxent River trib.) 02121101	None	None (for the Hall Creek watershed)	Watershed Plan (Calvert County FFY07 #19)	Project start 2009 Completed in 2011

TABLE 2. Active Projects In Calendar Year 2011 Using Federal 319(h) Grant Funds

Map Area	Watershed Name (Md 8-Digit #)	TMDL or WQA	Impairment *	Project Name (Lead Agency, Grant Year)	Status
11	Lower Monocacy River 02140302	Bacteria, Sediments	Bioassessment, Fecal Coliform, Phosphorus, Sedimentation, Total Suspended Solids	Bennett Creek Pilot Urban Wetlands Prog. (Frederick County, FFY07 #4)	Project start Nov. 2006 Completed 2011
				Bennett Creek Implementation (Frederick County, FFY08 #4)	Project start July 2008 Anticipate completion 2012
				Green Infrastructure Project (Frederick County, FFY10 #9)	Project start 2010 Anticipate completion 2013
	Statewide	N/A	N/A	Grant Administration (MDE FFY10 #3, FFY11 #3)	Multi Year/Grant Project
				Md Bioassessment Stream Survey (DNR, monitoring FFY10 #8)	Multi Year/Grant Project
				Nonpoint Source Program (MDE FFY10 #4, FFY11 #4)	Multi Year/Grant Project
				Nutrient Trading Pilot (Md Dept. of Agriculture FFY07 #22)	Project start 2009 Completed 2011
				Targeted Watershed (MDE monitoring/analysis FFY10 #5, FFY11 #5)	Multi Year/Grant Project
				Analysis and Local Technical Assistance (MDE FFY10 #1, FFY11 #1)	Multi Year/Grant Project
				Urban Stormwater Mgmt Implementation Tracking (MDE FFY10 #6, FFY11 #6)	Multi Year/Grant Project
				Volunteer Monitoring Symposium (DNR FFY9 #12)	Completed 2011
				Water Quality Protection Pilot (MDE FFY10 #13)	Anticipate completion 2012
9	Upper Choptank River 02130404	None	Bioassessment, Nitrogen, Phosphorus, PCB in fish tissue, Total Suspended Solids	Dept. of Publics SWM Retrofit (Caroline County FFY10 #7)	Project start 2011 Anticipate completion 2012

* The 2010 Integrated Report of Surface Water Quality in Maryland, in accordance with Clean Water Act Sections 303(d), 305(b) and 314.

TABLE 3. Projects Completed In Calendar Year 2011 Using Federal 319(h) Grant Funds

Map Area	Watershed Name (Md 8-Digit #)	Project Name * (Lead Agency)	Funding **		Accomplishments
			Federal $ Grant Year	Match $	
1	Aaron Run (Savage River Tributary) 02141006	Acid Mine Drainage Remediation (MDE)	113,160 FFY07 #12	75,540	This completed project reported overall pollutant load reductions accomplished by implementation funded in-part by three 319(h) Grant grants. (See the section on Aaron Run implementation)
4	Back River 02130901	Redhouse Run at St. Patrick Stream Restoration Baltimore County	418,500 FFY07 #18	279,000 Including approx. $84,152 State funds	This project restored 3,000 linear feet of stream and created 0.1 acres of wetland. These improvements provided stream bank stabilization and uptake/filtration of nutrients and sediment by floodplain plants. Overall, the projected resulted in pollutant load reductions of 609 lb/yr nitrogen, 32.1 lb/yr phosphorus, and 5.37 tons/yr suspended solids.
5	Casselman River (Youghioghy River tributary) 05020204	Watershed Plan (MDE, 2 programs: Abandoned Mine Lands Division and the Water Quality Protection and Restoration Program)	46,933 FFY08 #12	31,289	This EPA-accepted watershed plan calls for mitigation of drainage from abandoned mine lands at selected sites based on integrated review of field assessment/analysis. Implementation consistent with this plan will lead to pollution reduction and meeting a pH TMDL. This will allow for recovery of habitat and fish including trout.
6	Corsica River (Chester River tributary) 02130507	Agricultural Technical Assistance (Md Dept of Agriculture with the Queen Anne's SCD)	61,590 FFY10 #10	41,060	Ongoing project outcome for July 2010 through June 2011: 1) facilitated implementation of 8 BMPs including: 1 stream fencing (7,245 feet, 43 acres), 1 wetland restoration (3.5 acres) 1 rooftop runoff management, and 5 heavy use area pads. 2) 5,525 acres of cover crops were implemented resulting in annual pollutant load reductions: 53,259 lbs/yr nitrogen and 802 lbs/yr phosphorus. 3) 116 tons of horse manure were transported from the watershed for composting and reuse elsewhere. 4) Four composters were purchased and put to use as demonstration for horse manure management/reuse.
		Bioretention Swale (Queen Anne's County)	TBD (Up to $50,000) FFY08 #19	TBD	The County reconstructed 425 linear feet of drainage swale to promote uptake of stormwater runoff and nutrients by plants while also capturing sediment before it can reach the Corsica River. The estimated pollutant reduction for this project is: 0.22 lbs/yr nitrogen; 0.35 lbs/yr phosphorus; 0.739 tons/yr sediment (total suspended solids)

TABLE 3. Projects Completed In Calendar Year 2011 Using Federal 319(h) Grant Funds

Map Area	Watershed Name (Md 8-Digit #)	Project Name * (Lead Agency)	Funding **		Accomplishments
			Federal $ Grant Year	Match $	
7	Hall Creek (Patuxent River tributary) 02121101	Watershed Plan (Calvert County)	71,538 FFY07 #19	35,769	Calvert County created a Hall Creek watershed plan to meet EPA's guidance for components of a watershed based plan (A-I criteria). The project included extensive field assessment, some collection of water quality data, analysis by subwatershed, and identification of implementation project sites. In December 2011, EPA conditionally accepted the plan, i.e. several revisions are necessary before implementation in the watershed is eligible for 319(h) Grant funding.
11	Lower Monocacy River 02140302	Bennett Creek Pilot Urban Wetlands Program (Frederick County)	196,733 FFY07 #4	131,155	Projects results included: 1) Report on 4 years of habitat assessment/analysis. 2) Four wetland restorations and two tree plantings implemented through this project resulted in overall pollutant load reductions of 101.3 lbs/yr nitrogen, 18.5 lbs/yr phosphorus and 1.6 tons/yr sediment. 3) Several education/outreach events and publications were grant supported. 155 students received hands-on education by participating with these implementation projects. 26 grade school teachers received training on how to incorporate wetlands created by this project in their teaching. Produced signage for selected wetlands sites. 4) Water quality monitoring findings for one project reported.
	Statewide	MD Biological Stream Survey (DNR)	252,618 FFY09 #2	168,412	Ongoing project outcome for field work conducted during calendar year 2010 (final report dated June 2011): 1) Conducted sampling at 31 sites in 11 watersheds to address MDE needs regarding impaired waters regarding: fish, benthic macroinvertebrates, periphyton, water chemistry, physical habitat. 2) Conducted stream corridor assessments in two watersheds selected by MDE: South Branch Patapsco River in Carroll County, and Mattawoman Creek in Charles and Prince George's Counties. 3) Data for all the above was reported in database/GIS.

TABLE 3. Projects Completed In Calendar Year 2011 Using Federal 319(h) Grant Funds

Map Area	Watershed Name (Md 8-Digit #)	Project Name * (Lead Agency)	Funding **		Accomplishments
			Federal $ Grant Year	Match $	
	Statewide	Nutrient Trading Pilot (Md Dept. of Agriculture)	108,784 FFY07 #22	72,523	Project focused on implementing Maryland's agricultural nutrient trading (or offset) program: 1) Modified an existing Internet calculation tool and tested its function, performance and application. EPA Chesapeake Bay Program computations and features from USDA's Nutrient Tracking Tool were incorporated. The current version of the calculation tool and its accompanying modules are online at www.mdnutrienttrading.com. 2) Analyzed nutrient trading economics and incorporated the findings into the Internet tool. 3) Demonstrated some aspects of the tool: 100 accounts were opened; 130 farm property assessments were conducted and more than 50 were eligible to trade; 5 applications for trading were submitted. 4) Conducted education, outreach and training related to the tool and program including completion of an educational video. 1,200 people attended meetings and workshops. 186 people received hands-on training with the tools.
	Statewide	Volunteer Monitoring Symposium (Md. Dept. of Natural Resources)	15,000 FF09 #12	10,000	This project conducted a symposium on August 13, 2011 at Carroll Community College. The symposium was designed to provide information exchange and education to people involved in volunteer monitoring related to water quality and stream conditions. 397 people from 7 States and the Washington DC participated in 145 oral presentations, 24 workshops and 17 field trips.

* Statewide MDE projects that re-occur year after year are listed in Table 1 Active Projects but are not repeated in Table 2.

** Federal: Project expenditures reimbursed by Federal grant rounded to the nearest dollar. Match: Project expenditures covered by non-Federal fund sources. Some projects may also involve funding sources in addition to the Federal grant and the funding documented as match for the grant.

B. Implementation Tracking for Nonpoint Source Management

Nonpoint source implementation reporting included in this Annual Report three methods: Chesapeake Bay tracking, watershed-based plan tracking and water quality improvement.

To track Chesapeake Bay implementation, cumulative data on the best management practices constructed in Maryland's portion of the Chesapeake Bay is reported to EPA annually. The most recent cumulative information through 2010 is presented in Appendix C. This data is generated by MDE, several other State agencies and local governments. MDE collects the data from the other entities, provides quality control services, transforms the data into standardized reporting formats required by EPA and submits the data to the EPA Chesapeake Bay Program. During 2011, two MDE projects funded by the 319(h) Grant performed this work: 1) Analysis and Local Technical Assistance of NPS Pollution in Maryland, and 2) Urban Stormwater Management Tracking Implementation in Urban Areas.

To track watershed-based plan implementation, MDE enlists the government or private entity that is primarily responsible for each EPA-accepted watershed plan to report progress. These watershed plans are consistent with EPA guidance for components of a watershed-based plan (A-I Criteria). Implementation projects consistent with these watershed plans are eligible to use 319(h) Grant funds for implementation.

Table 4 lists watershed plans accepted by EPA in Maryland and Table 4a summarizes the total cumulative pollutant load reductions for the plans. By the end of 2011, EPA had accepted nine watershed plans. Consequently, implementation projects that are consistent with these plans are eligible to compete for 319(h) Grant funding. One watershed plan has conditional EPA acceptance, which means that several plan revisions are necessary in order for the plan to achieve full EPA acceptance and eligibility for implementation project funding by the 319(h) Grant.

MDE regularly assesses available information from at least three sources to find documented cases of water quality improvement / success stories:

- Impairments removed from the list of impaired water bodies (303(d) list) in Maryland's Integrated Report is reviewed biennially. 37 listings in the 2008 Report were delisted in the 2010 Report: 19 listings now meet water quality standards, 6 mercury or PCB listings now support designated use for fishing, 8 biological listings replaced by specific pollutant listings, 4 areas/impairment listings are no longer recognized as beaches. Review of these delistings could not document causality links to NPS implementation or potential candidates for success stories that meet EPA criteria.
- 319(h) Grant-funded projects' progress and accomplishments are assessed by MDE and reported in each Annual Report. Recent assessments identified potential future success story candidates.
- Candidates for water quality improvement / success stories are solicited from other sources by MDE. This approach has yielded at least one success story each year. In 2011, Montgomery County's success story in the Sligo Creek watershed was submitted to EPA for review and recognition. (See Appendix E.)

Table 4. Watershed Plans In Maryland Accepted by EPA		
Watershed	**Plan Description**	**2011 Progress**
Back River	*Upper Back River Small Watershed Action Plan.* Volume 1 and 2, Baltimore County Department of Environmental Protection and Resource Management, November 2008. (Drains to tidal Back River and then to Chesapeake Bay.) Accepted by EPA 2008. *Tidal Back River Small Watershed Action Plan.* Volume 1 and 2, Baltimore County Department of Environmental Protection and Resource Management, February 2010. (Tributary directly to the Chesapeake Bay.) http://www.baltimorecountymd.gov/Agencies/environment/watersheds/ep_brmain.html Accepted by EPA 2010.	Progress Reported (go to summary)
Casselman River	*Casselman River Watershed Plan for pH Remediation.* Maryland Department of the Environment, January 2010 revised 3/25/11. (Tributary to Ohio River Basin) http://mde.maryland.gov/programs/Water/319NonPointSource/Pages/casselman.aspx EPA Accepted 2011.	Progress Reported (go to summary)
Corsica River	*Corsica River Watershed Restoration Action Strategy.* Town of Centreville, Final Report September 2004. (Tributary to the Chester River and the Chesapeake Bay.) http://www.dnr.state.md.us/watersheds/surf/proj/wras.html Accepted by EPA 2005. In 2011, EPA requested a report on plan implementation progress and, as appropriate, revisions to the 2005 plan in consideration of the report. Satisfactory response to this request is necessary to be eligible for future 319(h) Grant funding.	Progress Reported (go to summary)
Jones Falls	*Lower Jones Falls Watershed Small Watershed Action Plan.* Baltimore County, October 15, 2008. (Tributary to Patapsco River and Chesapeake Bay.) http://www.baltimorecountymd.gov/Agencies/environment/watersheds/ep_jonesmain.html Accepted by EPA 2008.	Progress Not Reported (no 319 projects)
Lower Monocacy River	*Lower Monocacy River Watershed Restoration Action Strategy (WRAS) Supplement*: *EPA A-I Requirements, Frederick County Maryland.* July 2008, Version 1.0. (Tributary to the Potomac River and the Chesapeake Bay.) http://www.watershed-alliance.com/mcwa_pubs.html Accepted by EPA 2008.	Progress Reported (go to summary)
Spring Branch	*Spring Branch Subwatershed – Small Watershed Action Plan (Addendum to the Water Quality Management Plan for Loch Raven Watershed).* Baltimore County, March 2008. (Tributary to the Loch Raven Reservoir, then to the Gunpowder River and then to the Chesapeake Bay.) http://www.baltimorecountymd.gov/Agencies/environment/watersheds/ep_lrmain.html Accepted by EPA 2008.	Completion reported in Maryland's 2009 319 NPS Annual Report
Sassafras River	*Sassafras Watershed Action Plan*. Sassafras River Association. (Tributary directly to the Chesapeake Bay.) www.sassafrasriver.org/swap/ Accepted by EPA 2009	Progress Reported (go to summary)
Upper Choptank River	*Upper Choptank River Watershed Based Plan Developed to be Consistent with EPA's 319(h) Nonpoint Source Program Grant "A through I Criteria"*. Caroline County, November 2010. (Tributary to the lower Choptank River and the Chesapeake Bay.) http://www.carolineplancode.org/ Accepted by EPA 2010.	Progress Reported (go to summary)

Table 4a. Total Cumulative Watershed Plan Implementation Pollutant Load Reduction Reported From Plan Acceptance By EPA Thru 2011

Watershed	Subwatershed	Nitrogen	Phosphorus	Sediment	Acid	Iron	Aluminum
		lbs/yr	lbs/yr	tons/yr	tons/yr	tons/yr	tons/yr
Aaron Run		NR	NR	NR	61.1	7.5	4.7
Back River	Tidal	NR	NR	NR	NR	NR	NR
	Upper	609	32.1	5.37	NR	NR	NR
Casselman River		NR	NR	NR	NR	NR	NR
Corsica River		48,929	39,486	718	NR	NR	NR
Lower Jones Falls		NR	NR	NR	NR	NR	NR
Lower Monocacy River	All Other	2,106.6	156.2	22.8	NR	NR	NR
	Lake Linganor	NR	47.9	9.6	NR	NR	NR
Sassfras River		NR	NR	NR	NR	NR	NR
Upper Choptank River		704,000	34,500	NR	NR	NR	NR
TOTAL		755,644.6	74,222.2	755.77	61.1	7.5	4.7

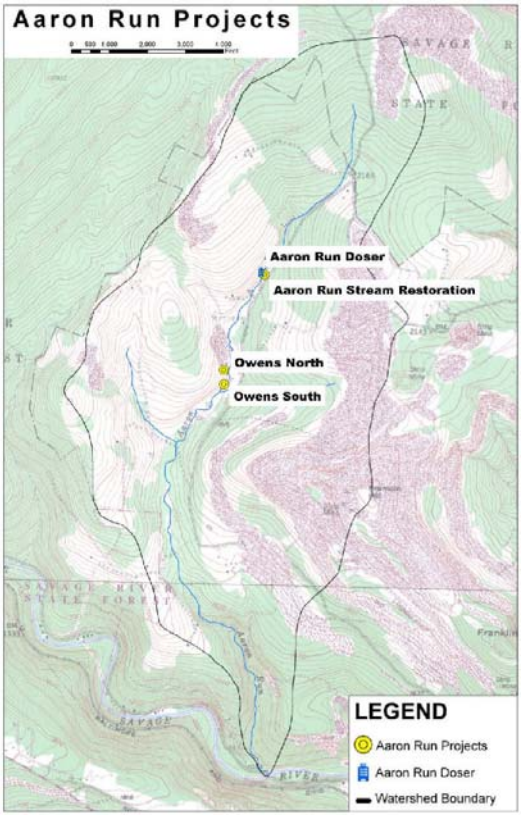
NR – not reported.

1. Lower Monocacy River Watershed Plan Is Nationally Recognized

In 2011, EPA recognized Frederick County's *Lower Monocacy River Watershed Restoration Action Strategy (WRAS) Supplement* as one of the best watershed plans in the nation. EPA's recognition was given to only four of the 49 plans reviewed.

The Lower Monocacy watershed plan demonstrates how EPA's guidance regarding their components of a watershed plan (A-I criteria) was applied to produce an effective nonpoint source implementation strategy. More information on EPA's review of the Lower Monocacy watershed plan is in Appendix F.

Figure 5. Following release of the national report in July 2011, EPA Region III presented MDE with this Certificate. This Certificate recognizes the work by the Frederick County, Community Development Division, Watershed Management Section who crafted the document and were open to MDE's input on technical issues and recommendations on integrating EPA's A-I criteria into the County's watershed plan.



2. Aaron Run Watershed
AMD Mitigation Completed

Location

Aaron Run is a tributary to the Savage River, which drains to the Potomac River and then to the Chesapeake Bay. The watershed area is about 3.5 square miles entirely within Garrett County, Md.

Goal

One legacy of past coal mining in this watershed is continuing acid mine drainage (AMD). The intent of the 319(h) Grant-funded projects was to mitigate AMD in the Aaron Run mainstem to allow for re-establishment of native brook trout populations and recovery of fish populations.

Implementation

Beginning in October 2005, 319(h) Grant funds helped to pay for an assessment of acid mine drainage sources in the Aaron Run watershed, selection of mitigation sites and technologies, project designs and implementation of the projects. Implementation was completed August 2011. The tables on the next page summarize project results and 319(h) Grant contributions.

Figure 6. Left: EPA and MDE personnel inspect the Doser installed at Aaron Run to meter out lime adding alkalinity and counteracting in-stream acidity. Above: The oxidizing pond (foreground) and Successive Alkalinity Producing System (SAPS) cell (background) are treating AMD and discharging pH adjusted water into Aaron Run. (Map and photos provided by MDE)

Table 5. Aaron Run Watershed Pollutant Load Reduction Following Completion of Watershed Plan Implementation

Location	BMP	Acid			Iron			Aluminum		
		Lbs/Day	Lbs/Yr	Tons/ Yr	Lbs/Day	Lbs/Yr	Tons/Yr	Lbs/Day	Lbs/Yr	Tons/Yr
Owens North	Alkaline Leach Bed	42.4	15,478.4	7.7	8.4	3,052.7	1.5	3.0	1,113.6	0.6
Owens South	SAPS Cell	173.2	63,219.0	31.6	26.3	9,616.0	4.8	11.1	4,067.9	2.0
Stream Restoration	Doser	73.0	26,630.9	13.3	4.6	1,695.6	0.9	6.6	62,435.2	1.2
	SAPS Cell	49.5	18,080.7	9.0	1.6	566.1	0.3	5.1	1,852.7	0.9
TOTAL		338.1	123,409.0	61.6	40.9	14,930.4	7.5	25.8	9,469.4	4.7

The estimated pollutant load reductions resulting from the Aaron Run Acid Mine Drainage mitigation project shown above are based on monitoring conducted in the immediate area of each implementation site shortly after completion of project implementation in 2011. MDE is continuing to conduct periodic in-stream monitoring of project results and improvement of stream conditions for at least a year following completion of the Aaron Run implementation. The monitoring will help to document continuing project success and anticipated recovery of aquatic life. 2011-2012 in-stream monitoring is funded in part by 319(h) Grant project FFY2011 GRTS #5.

Table 6. Aaron Run Watershed - 319(h) Grant Projects Funding Implementation

MDE Project Name/Description	319(h) Grant Year Project # (1)	Grant Project Status	319(h) Grant Funds (2)	MATCH	Total Cost (4)
Aaron Run Watershed Remediation Project	FFY05 #19	Closed	$119,000.00	$79,333.33	$198,333.33
	FFY06 #1	Closed	$372,274.72	$248,183.15	$620,457.87
	FFY07 #12	Closed	$114,656.82	$76,437.88	$191,094.70
Total 319(h) Grant and Match for the grant			$605,931.54	$403,954.36	$1,009,885.90

1. All 319(h) Grant-funded implementation is reported.
2. Match includes funding from other sources including other Federal grants and/or State funds.
3. Funding/expenditures summarized in table is limited to implementation. Expenditures for monitoring and other activities are not shown.

3. Back River Watersheds

Location

The Back River watershed is located in Baltimore County and Baltimore City. This watershed is divided into two subwatersheds as shown in the map and summarized in the table below. A watershed plan for the Tidal and for Upper Back River subwatershed was accepted by EPA.

Implementation

Projects that are implementing watershed plan goals are summarized on the next pages. All projects using 319(h) Grant funds to date have been in Baltimore County's portion of the Upper Back River watershed. Other implementation progress contributing to watershed plan goals included in the tables was reported by Baltimore County, including projects conducted by nongovernmental organizations.

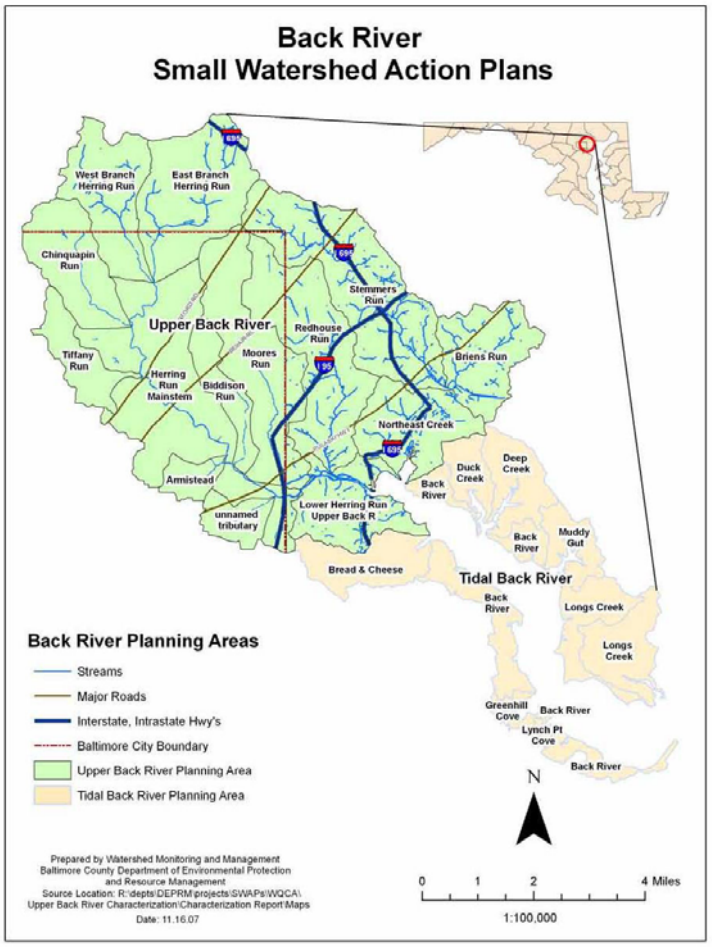


Figure 7. Back River Watersheds.

Table 7. Back River Small Area Watershed Plans	
Upper Back River Watershed	**Tidal Back River Watershed**
Pollutant Load Reduction Goals - Total nitrogen: 48,190 pounds - Total phosphorus: 6,056 pounds Total drainage area: 27,716.7 acres (43.3 mi^2) Total open tidal water: NA Baltimore Co.: 55.5%; Baltimore City: 44.5%. Impervious cover: 30.7 % Land Use - Agriculture: --- - Commercial: 9.9% - Forest: 11.5% - Industrial: 6.5% - Institutional: 8.0% - Residential low density: 8.5% - Residential mid density: 26.5% - Residential high density: 20.4% - Urban open: 6.2% - Water/Wetlands: ---	Pollutant Load Reduction Goals - Total nitrogen: 6,498 pounds - Total phosphorus: 679 pounds Total Drainage area: 7,720 acres (12 mi^2) Total open tidal water: 3,947 acres (6.2 mi^2) Baltimore County: 100% Impervious cover: 18.4% Land Use - Agriculture: 4.4% - Commercial: 7.2% - Forest: 32.1% - Industrial: 3.5% - Institutional: 4.4% - Residential low density: 2.4% - Residential mid density: 23.0% - Residential high density: 8.6% - Urban other: 11.4% - Water/Wetlands: 3.0%

Table 8. Upper Back River Watershed Plan - 2011 Implementation Progress Summary

Goals			Progress (3)					
			Implementation (4)			Pollutant Reduction 2008-2011		
Category (2)	Unit	Goal	2011 (5)	2008 - 2010	Percent of Goal	Nitrogen (lbs/yr)	Phosphorus (lbs/yr)	Sediment (tons/yr)
Reforestation - Forest Land Mgmt	acres	50	2	NA	4%	NR	NR	NR
Buffer Reforestation, Forest Stand Mgmt	acres	200	0.4	0	0%	NR	NR	NR
Nutrient Management	acres	3,000	0	0	0%	NR	NR	NR
Downspout Disconnect, Roof Runoff Mgmt	acres	180	0.2	0.69	0%	NR	NR	NR
Stream Channel Restoration (5)	feet	66,000	3,000	0	5%	609	32.1	5.37
Street Trees, Tree/Shrub Establishment	units	4,000	0	119	3%	NR	NR	NR
Stormwater Retrofits & Mgmt Wetlands	units	50	0	1	2%	NR	NR	NR
Stormwater Conversion, Urban Wet Pond	units	17	0	5	29%	NR	NR	NR
					Total Pollutant Reduction	609	32.1	5.37
					Watershed Plan Nutrient Reduction Goal	48,190	6,056	---
					Percent of Goal Achieved	1.3%	0.5%	---

1. 2011 = Calendar year. NA = not applicable. NR = not reported. BMP = best management practice.
2. Categories for watershed plan goals tracked by EPA for progress. All 319(h) Grant-funded implementation is reported.
3. Data is reported by Baltimore County, which includes results of nongovernmental organization activities.
4. All 319(h) Grant-funded implementation is reported.
5. 2011 and pollutant reduction shown includes reporting from Redhouse Run at St. Patricks stream restoration.

Table 9. Tidal Back River Watershed Plan - 2011 Implementation Progress Summary

Goals			Progress (3)					
			Implementation (4)			Pollutant Reduction 2008-2011		
Category (2)	Unit	Goal	2011	2008 - 2010	Percent of Goal	Nitrogen (lbs/yr)	Phosphorus (lbs/yr)	Sediment (tons/yr)
Reforestation - Forest Land Mgmt	acres	35	1.5	NA	4.3%	NR	NR	NR
Buffer Reforestation, Forest Stand Mgmt	acres	156	0.3	0	0.2%	NR	NR	NR
Nutrient Management	acres	186	0	0	0%	NR	NR	NR
Downspout Disconnect, Roof Runoff Mgmt	acres	31	0	0	0%	NR	NR	NR
Stream Channel Restoration	feet	17,040	0	0	0%	NR	NR	NR
Street Trees, Tree/Shrub Establishment	acres	1.7	0	0	0%	NR	NR	NR
Stormwater Retrofits & Mgmt Wetlands	acres	6.4	0	0	0%	NR	NR	NR
Stormwater Conversion, Urban Wet Pond	units	2	0	0	0%	NR	NR	NR
Shoreline Protection/Enhancement	units	NA	0	0	NA	NR	NR	NR
					Total Pollutant Reduction	0	0.0	0.00
					Watershed Plan Nutrient Reduction Goal	6,498	679	---
					Percent of Goal Achieved	0.0%	0.0%	---

1. 2011 = Calendar year. NA = not applicable. NR = not reported. BMP = best management practice.
2. Categories for watershed plan goals tracked by EPA for progress. All 319(h) Grant-funded implementation is reported.
3. Data is reported by Baltimore County, which includes results of nongovernmental organization activities.
4. As of December 2011, all projects in the Tidal Back River watershed are funded by sources other than the 319(h) Grant.

Figure 8. Redhouse Run Stream Restoration completed 2011.
Left: The map shows the area of Baltimore County's Redhouse Run stream restoration project near St. Patrick Road.
Center: Before the Redhouse Run project, severe bank erosion neared structures on residential lots.
Right: After the project, the same stream bank has been regraded and stabilized.
(Map and photos: Baltimore County Department of Environmental Protection and Sustainability.)

Table 10. Upper Back River Watershed - 319(h) Grant Projects Funding Implementation

Projects in Baltimore County (1)	Grant Year Project # (2)	Grant Project Status	319(h) Funds (3)	Total Cost (4)	Estimated Load Reduction (5)		
					Nitrogen (lb)	Phosphorus (lb)	Sediment (ton)
Redhouse Run/Overlea stormwater NPS control and stream restoration	FFY2000 #16	Closed 2001	$130,000	$530,000	--	9.46	2.67
Redhouse Run at St. Patricks stream restoration	FFY2007 #18	Closed 2011	$418,500.00	$883,016.00	609	32.1	5.37
Upper Back River stormwater NPS control	FFY2008 #21	Preconstruction	$422,373	$700,000	371.5	56.4	10.6
Bread and Cheese Creek stormwater NPS control and stream restoration	FFY2010 #11	Preconstruction	$556,443	$1,000,000	200.5	29.6	6.75

(1) Implementation directly or indirectly supported by the 319(h) Grant. Excludes projects/costs for management oversight, monitoring, etc.
(2) Additional information is available at http://iaspub.epa.gov/pls/grts/f?p=110:199:618139948454479 Select "Find Projects" and select "Maryland", grant year, project #.
(3) Closed projects = total 319(h) Grant funds expended for project. Other projects = 319(h) Grant allocated. Excludes match.
(4) Closed projects = reported total expenditure. Other projects = projected total cost. Redhouse Run total cost includes all design/construction expenditures.
(5) Closed projects = reported annual pollutant reduction. Other projects = projected future pollutant reduction.

4. Casselman River Watershed 2011 Implementation Status

Location

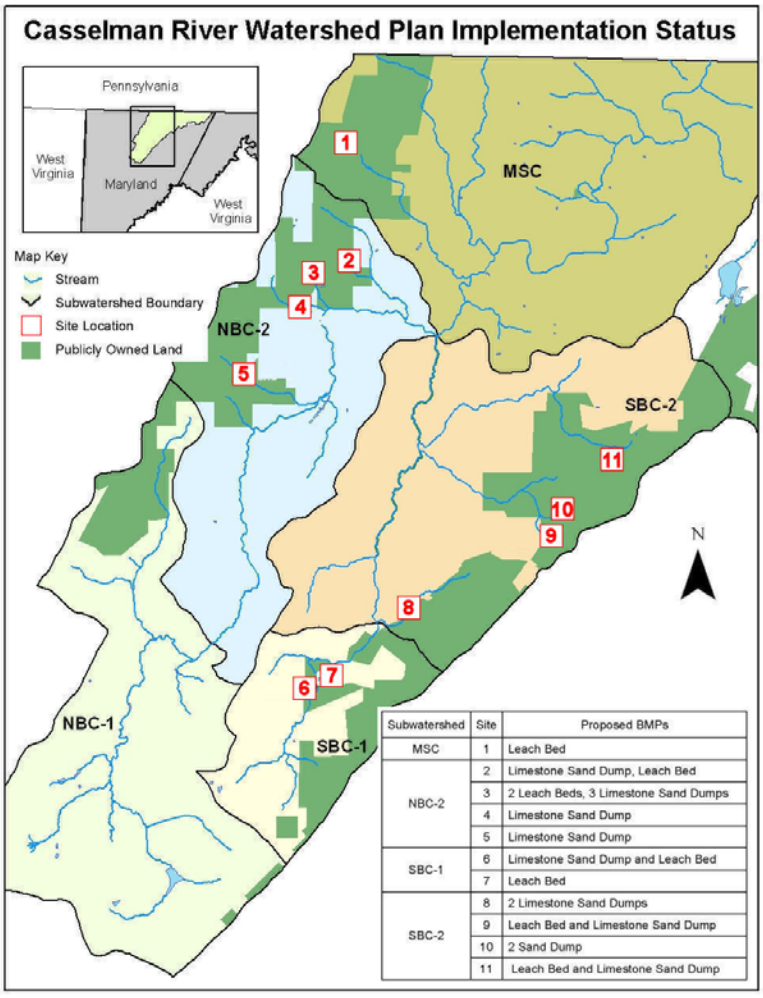
In Maryland, the Casselman River flows about 20 miles from Savage River State Forest into Pennsylvania. The watershed area is 66 square miles and is part of the Mississippi River drainage. Land use in the watershed can be aggregated into three broad categories:
- 89% woodland,
- 9% agriculture,
- 2% developed lands.

Goal

The watershed plan goal is to meet pH water quality standards in the Code of Maryland Regulations (no less than 6.5 pH and no greater than 8.5 pH) by increasing alkalinity (mg $CaCO_3$/l).

Implementation

In 2011, EPA accepted the Casselman River watershed plan and released FFY09 319(h) Grant funds earmarked for plan implementation. Preparations for implementation of Phase 1 projects at sites shown in the map began in 2011 and construction will begin in 2012.



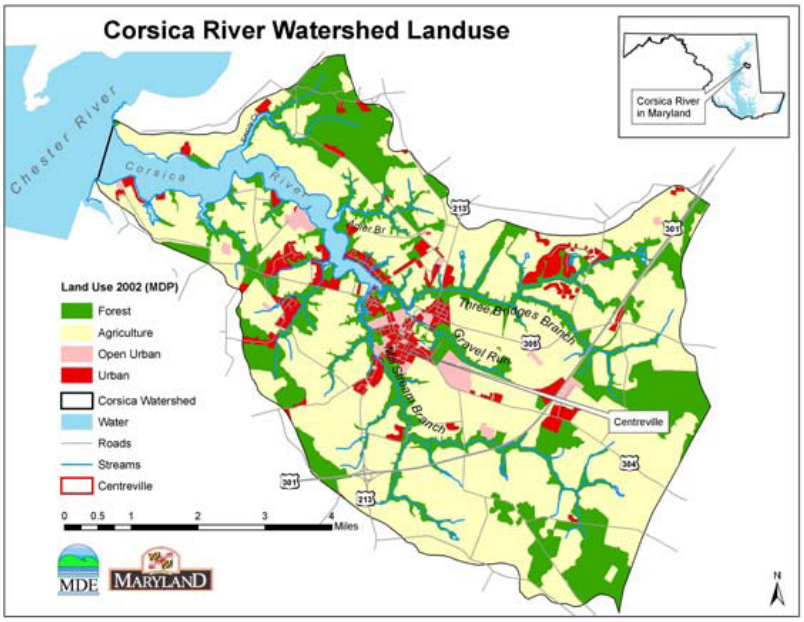
Subwatershed	Site	Proposed BMPs
MSC	1	Leach Bed
NBC-2	2	Limestone Sand Dump, Leach Bed
	3	2 Leach Beds, 3 Limestone Sand Dumps
	4	Limestone Sand Dump
	5	Limestone Sand Dump
SBC-1	6	Limestone Sand Dump and Leach Bed
	7	Leach Bed
SBC-2	8	2 Limestone Sand Dumps
	9	Leach Bed and Limestone Sand Dump
	10	2 Sand Dump
	11	Leach Bed and Limestone Sand Dump

Figure 9. Top: Monitoring conditions in the Casselman River.
Left: Surface preparations for an underground coal mine in the Casselman River watershed.
(Map and Figures by MDE, 2011)

5. Corsica River Watershed 2011 Implementation Status

Location

The Corsica River, which is 6.5 miles in length, is located in the upper eastern shore in Queen Anne's County. The watershed area is 40 square miles and is part of the larger Chester River Watershed (see map). Land use in the watershed can be aggregated into three broad categories:
- 66% agriculture,
- 26% woodland,
- 8% various types of developed lands.



Goal

The nonpoint source annual TMDL load allocation for nitrogen is 268,211lbs and for phosphorus is 19,380 lbs. Corsica River watershed ambient NPS nutrient loads already met the TMDL when it was approved by EPA, so the TMDL serves as a benchmark to prevent degradation (TMDL page 4 and 20). In addition, other goals were established as listed in the following implementation progress tables.

Implementation

Tables and photographs beginning here and continuing on the next pages summarize currently available watershed plan implementation progress.

Figure 10.

Top Right: The living shoreline is being constructed on the shoreline perpendicular to the roadway in Centreville's Wharf Area during May 2011.

Bottom Right: Wharf-living-shoreline-2011August: Newly completed living shoreline with breakwaters shortly after construction in August 2011.

Photos by Eva Kerchner, Watershed Coordinator, Town of Centreville

Table 11. Corsica River Watershed Plan - 2011 Implementation Progress Summary

Goals			Progress (3)					
Category (2)	Unit	Goal	Implementation Progress (4)			Total Pollutant Reduction Reported 2006-2011		
			2011 (5)	2006 thru 2010	Percent of Goal Achieved	Nitrogen (lbs/yr)	Phosphorus (lbs/yr)	Sediment (tons/yr)
Agricultural BMPs	units	---	---	NR	NA	34,590	4,711	716
Cover Crop (6)	acres	6,000	4,808	NA	80%	11,643	34,558	NR
Conservation Cover (ag buffers)	acres	100	---	93.3	93%	2,173	141	NR
Forest Buffers (urban)	acres	200	---	12	6%	28	8	NR
Manure Transfer (6)	tons	27.4	0	NA	0%	0	0	NA
Oyster Bed Restoration	acres	10	---	10	100%	NA	NA	NA
Raingardens/Bioretention	units	50	---	308	616%	150	20	1.5
Septic Tank Upgrades	systems	30	---	14	47%	73.0	NA	NA
Stormwater Retrofits	acres	300	6.1	106.4	37.5%	61.7	5.9	NR
Waste Storage Facilities	units	1	---	1	100%	210.0	42.0	NA
Wetland Restoration	acres	50	---	88.3	177%	NR	NR	NR
					Total Pollutant Reduction	48,929	39,486	718
					Watershed Plan Nutrient Reduction Goal	100,132	6,306	---
					Percent of Goal Achieved	48.9%	626.2%	---

1. 2011 = Calendar year. NA = not applicable. NR = not reported. BMP = best management practice.

2. Categories for watershed plan goals tracked by EPA for progress.

3. Data is provided by the Town of Centreville in cooperation with the Corsica Implementers Group.

4. All 319(h) Grant-funded implementation is reported.

5. In most cases, data for calendar year 2011 is shown in aggregate with previous years and was not available separately.

6. Accomplishments for cover crops and manure transfer are considered annual practices. Therefore, reporting in this table is limited to the most recent calendar year. Significant accomplishments 2006 thru 2010 are reported, see footnote 3.

The Town of Centreville also reported the following 2011 accomplishments:

- 275 linear feet of living shoreline was completed on the Corsica River as part of a larger project called the Wharf Area. The living shoreline is protected by breakwaters to limit erosion. The 319(h) Grant funded project management. All other costs were funded by the Maryland Waterway Improvement Program, the Maryland Chesapeake Bay Trust and Federal NOAA funding. (photos on previous page)
- A stream buffer was improved at a local cemetery in Spring 2011 by planting 255 shrubs/trees and 900 young trees called “whips”. Maryland’s Natural Filters program funded the project.
- 160 rain barrels were sold at a reduced cost of $10 to residents during 2011. Purchase of the rain barrels was funded by Maryland’s Chesapeake and Atlantic Coastal Bays Trust Fund. The 319(h) Grant funded project management and outreach.

Table 12. Corsica River Watershed - 319(h) Grant Projects Funding Implementation							
Project Description (1)	**Grant Year Project # (2)**	**Grant Project Status**	**319(h) Funds (3)**	**Total Cost (4)**	**Estimated Load Reduction (5)**		
					Nitrogen (lb)	Phosphorus (lb)	Sediment (ton)
Centreville Corsica Watershed Restoration Project	FFY2005 #2	Completed	232,666.15	387,776.92	0	0	NR
	FFY2006 #3	Completed	241,974.82	403,291.37	62	6	NR
	FFY2009 #1	In Progress	300,504	500,840	NR	NR	NR
MDA / Queen Anne's Soil Conservation District Agricultural Technical Assistance Project	FFY2005 #12	Completed	145,554.24	242,590.40	767	79	463
	FFY2006 #9	Completed	14,272.71	23,787.85	NR	NR	NR
	FFY2007 #6	Completed	22,187.16	36,978.60	286	10	755
	FFY2008 #7	Completed	50,780.00	84,633.00	46	3	62
	FFY2009 #4	Completed	58,539.00	97,565.00	19,740	6,664	33
	FFY2010 #10	Completed	61,590.00	102,650.00	53,259	802	NR
	FFY2011 #10	In Progress	69,546	115,910	NR	NR	NR
Queen Anne's County Corsica and Beyond Project	FFY2006 #13	Completed	124,281.44	207,135.73	NR	NR	NR
Queen Anne's County Bio-Retention Swale Project	FFY2008 #19	In Progress	50,000	pending	0.22	0.35	0.74

(1) Implementation directly or indirectly supported by the 319(h) Grant. Excludes 319(h) Grant projects that do not include implementation.
(2) Additional information is available at http://iaspub.epa.gov/pls/grts/f?p=110:199:6181399484544 79 Select "Find Projects" and select "Maryland", grant year, project #.
(3) Closed projects = total 319(h) Grant funds expended for project. Other projects = 319(h) Grant allocated. Excludes match.
(4) Closed projects = total expenditure Federal Grant + nonfederal match unless noted otherwise. Other projects = projected total cost.
(5) NR = not reported. Closed projects = reported annual pollutant reduction rounded to nearest pound/ton. Other projects = projected future pollutant reduction.

Figure 11.
Right: Monitoring Gravel Run.
Middle Right: 30 students in Centreville's Kennard Elementary School volunteered in the 2011 hands-on education program to create these rain barrels.
Far Right: Volunteers planting shoreline grasses.
Photos by Corsica Implementers and Eva Kerchner, Watershed Coordinator, Town of Centreville.

6. Lower Jones Falls 2011 Implementation Status

Location

The Lower Jones Falls watershed encompasses 16,550 acres (25.9 mi^2) that drains portions of Baltimore County (30.09%) and Baltimore City (69.91%). About 54 miles of streams in the watershed flow into the tidal Patapsco River and then the Chesapeake Bay. Land use in the watershed is 55.9% residential (11.1% low density, 23.7% mid density and 21.1% high density). Various developed land uses cover 21.7% of the watershed (6.9% commercial, 2.4% industrial, 10.5% institutional and 1.9% highway). Open land uses account for the remaining 22.2% of the watershed area (6.1% open urban, 13.6% forest, 1.3% agriculture, 0.6% bare ground, 0.6% extractive and 0.3% water). Overall impervious cover is 31.8%.

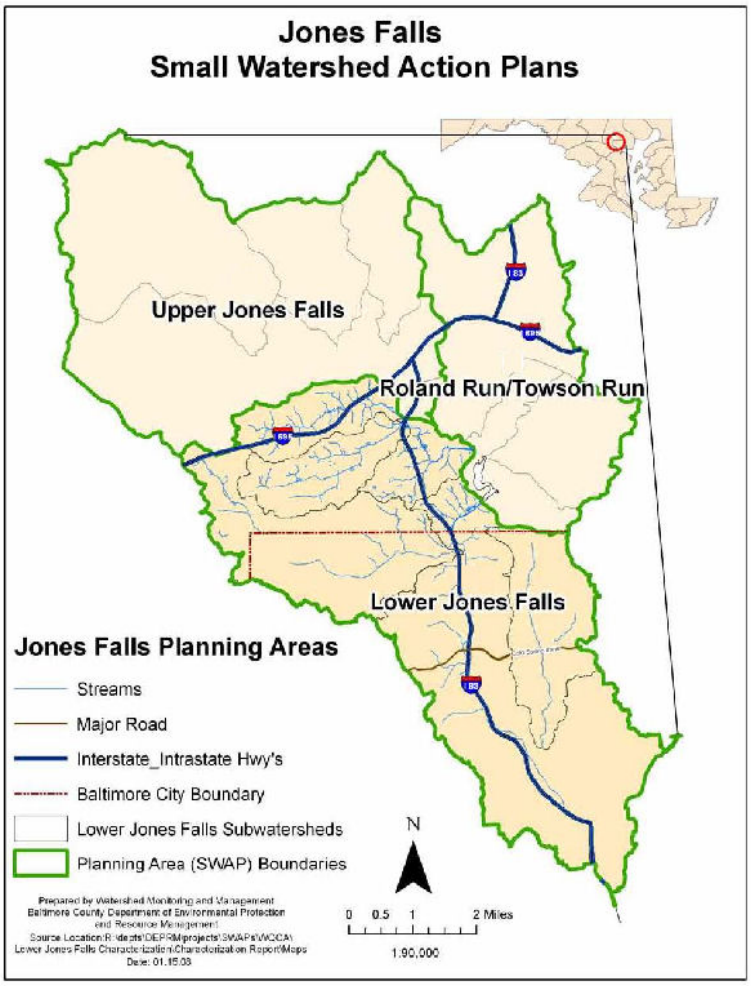


Figure 12. Map of Jones Falls

Goals

The Lower Jones Falls Watershed Small Watershed Action Plan (Plan) was developed by Baltimore County in 2008 (CWA 104(b) funding) in conjunction with Baltimore City and the Jones Falls Watershed Association. (Go to http://www.baltimorecountymd.gov/Agencies/environment/watersheds/ep_jonesmain.html) The Plan was accepted by EPA in 2009. The 2008 Plan calls for the nutrient load reductions shown in the following table (including sanitary sewer overflow abatement).

Baltimore County anticipates that the watershed goals will be updated due to recent changes in the Chesapeake Bay Watershed Model and issuance of the Chesapeake Bay TMDL.

Implementation in the Lower Jones Falls Watershed

Currently, all active implementation projects in the Jones Falls watershed do not involve the 319(h) Grant. Implementation progress reported by Baltimore County for the 2009-2011 time period is shown in the following table.

In Baltimore City, several implementation projects are in progress or planned. Lower Stoney Run stream restoration project will stabilize several thousand feet of stream using natural channel design techniques (design: $0.2 million, construction: $1 million, construction completion anticipated 2011). The Western Run Stream restoration (ER4014 Project 1) will stabilize 2,100 feet of stream (design: $235,776, construction $600,000, potential 2010-2011 start). The East Stoney Run Phases I and II will stabilize stream using natural channel design techniques (design: $0.4 million, construction: $4 million, potential construction start 2010-2011).

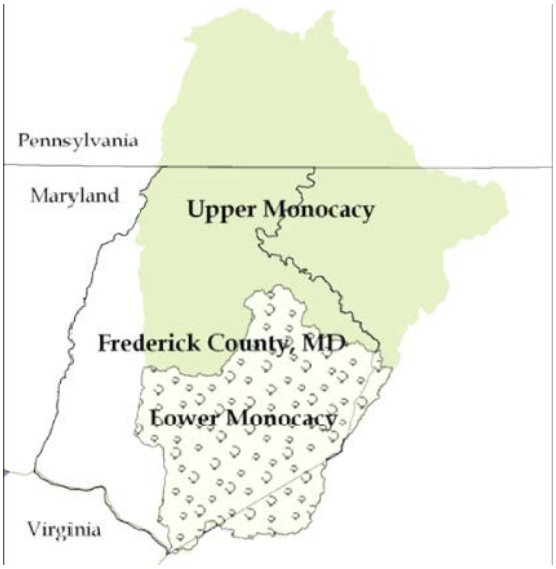
Table 13. Lower Jones Falls Watershed Plan - 2011 Implementation Progress Summary

Goals			Progress (3)					
Category (2)	Unit	Goal	Implementation (4)			Total Pollutant Reduction Reported		
			2011	2008 - 2010	Percent of Goal	Nitrogen (lbs/yr)	Phosphorus (lbs/yr)	Sediment (tons/yr)
Reforestation - Forest Land Mgmt	acres	2	0.9	NA	45.0%	NR	NR	NR
Buffer Reforestation, Forest Stand Mgmt	acres	NA	0.7	0	NA	NR	NR	NR
Nutrient Management	acres	2,210	NR	NR	NA	NR	NR	NR
Downspout Disconnect, Roof Runoff Mgmt	acres	250	0.2	0.03	0.1%	NR	NR	NR
Stream Channel Restoration (5)	feet	20,000	NR	NR	NA	NR	NR	NR
Street Trees, Tree/Shrub Establishment	units	1,000	NR	NR	NA	NR	NR	NR
Stormwater Retrofits, Urban SWM Wetlands	acres	100.0	NR	NR	NA	NR	NR	NR
Stormwater Conversion, Urban Wet Pond	units	NA	NR	NR	NA	NR	NR	NR
					Total Pollutant Reduction	0	0	0
					Watershed Plan Nutrient Reduction Goal	111,160	14,357	---
					Percent of Goal Achieved	0%	0%	---

1. 2011 = Calendar year. NA = not applicable. NR = not reported. BMP = best management practice.
2. Categories for watershed plan goals tracked by EPA for progress. All 319(h) Grant-funded implementation is reported.
3. Data is reported by Baltimore County, which includes results of nongovernmental organization activities.
4. All 319(h) Grant-funded implementation is reported.

7. Lower Monocacy River

Location



The Lower Monocacy River watershed encompasses 194,700 acres (304 mi^2) that drains portions of Frederick County (87%), Montgomery County (10%) and Carroll County (3%). The mainstem of the Monocacy River is 58 miles long. About 304 square miles of watershed drain into the tidal Potomac River and then the Chesapeake Bay. Overall impervious cover is 4% but it is concentrated in two subwatersheds: Carroll Creek (18.6%) and Ballenger Creek (13.4%). Land use in the watershed is:

- 47% Agricultural
- 30% Forest
- 22% Developed land uses

Goals and Implementation

The Lower Monocacy River Watershed Restoration Action Plan was developed by Frederick County in 2004 to address the 168,960 acres (264 mi^2) that drain Frederick County. In 2008, the County used local funds to revise the Plan and EPA accepted the revision. The Plan's 25-year goals and implementation progress are presented in the following tables.

Figure 13. The photographs show two projects that were executed and completed during 2011 using the 319(h) Grant.
Left: Excavation of a wetland project installed at the Worthington Manor Golf Course in July 2011.
Below: Students and community volunteers work together to plant native trees, shrubs and grasses as part of the Urbana Elementary School's bioswale project.

(The map and photos were provided by Frederick County Community Development Division Watershed Management Section.)

Table 14. Lower Monocacy River Watershed Plan Implementation Progress Summary								
Lower Monocacy Goals				**Lower Monocacy Implementation Progress**				
Parameter		**Unit**	**Units Needed**	**2011**	**Previous Years**		**Total Thru 2011**	**Goal % Achieved**
					2008-2010	**Pre- 2008**		
Nitrogen	Agriculture	Pounds	582,949	NR	NR	NR	NR	NR
	Urban	Pounds	67,049	532.6	1,003.0	571.0	2,106.6	3.14%
Phosphorus	Agriculture	Pounds	57,337	NR	NR	NR	NR	NR
	Urban	Pounds	11,615	46.6	76.2	33.4	156.2	1.34%
Sediment	Agriculture	Pounds	18,342,280	NR	NR	NR	NR	NR
	Urban	Pounds	2,348,084	9,225.6	23,225.0	13,149.7	45,600.4	1.94%
Lake Linganore Goals				**Lake Linganore Implementation Progress**				
Phosphorus	Agricultural	Pounds	601,489.60	NR	NR	NR	NR	NR
	Urban	Pounds	92,106.30	2.1	20.2	25.6	47.9	0.05%
	Forest	Pounds	4,186.70	NR	NR	NR	NR	NR
Sediment	Agricultural	Tons	38,401	NR	NR	NR	NR	NR
	Urban	Tons	3,615	0.4	4.5	4.6	9.6	0.26%
	Forest	Tons	1,033	NR	NR	NR	NR	NR

1. 2011 = Calendar year. NA = not applicable. NR = not reported. 2. All 319(h) Grant-funded implementation is reported.
3. Implementation accomplished with "other" funding sources may not be fully tracked or reported.
4. Lake Linganore drainage is a subwatershed with a TMDL that is within the larger Lower Monocacy River watershed.

Table 15. Lower Monocacy River Watershed - 319(h) Grant Projects Funding Implementation							
Frederick County Project Description (1)	**Grant Year Project # (2)**	**Grant Project Status**	**319(h) Funds (3)**	**Total Cost (4)**	**Estimated Load Reduction (5)**		
					Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (ton/yr)
Lower Monocacy Watershed Restoration	FFY05 #17	Closed	$216,237.00	$360,395.00	615.9	43.9	8.2
Urban Wetlands Program, Bennett Creek Pilot	FFY07 #4	Closed	$196,732.92	$327,888.00	101.3	18.5	1.6
Bennett Creek Urban BMP Demonstration	FFY08 #4	In Progress	$234,545	$390,900	194.5	45.1	4.4
Lower Monocacy Green Infrastructure	FFY10 #9	In Progress	$318,396	$530,660	247	25.9	4.9

(1) Implementation directly or indirectly supported by the 319(h) Grant. Excludes projects/costs for management oversight, monitoring, etc.
(2) Additional information at http://iaspub.epa.gov/pls/grts/f?p=110:199:618139948454479 Select "Find Projects".
(3) Closed projects = total 319(h) Grant funds expended for project. Other projects = total 319(h) Grant to project excluding match.
(4) Closed projects = reported total expenditure. Other projects = projected total cost, including project activities in addition to implementation.
(5) Closed projects = reported annual pollutant reduction. Other projects = projected future pollutant reduction in the project scope of work.

8. Sassafras River Watershed

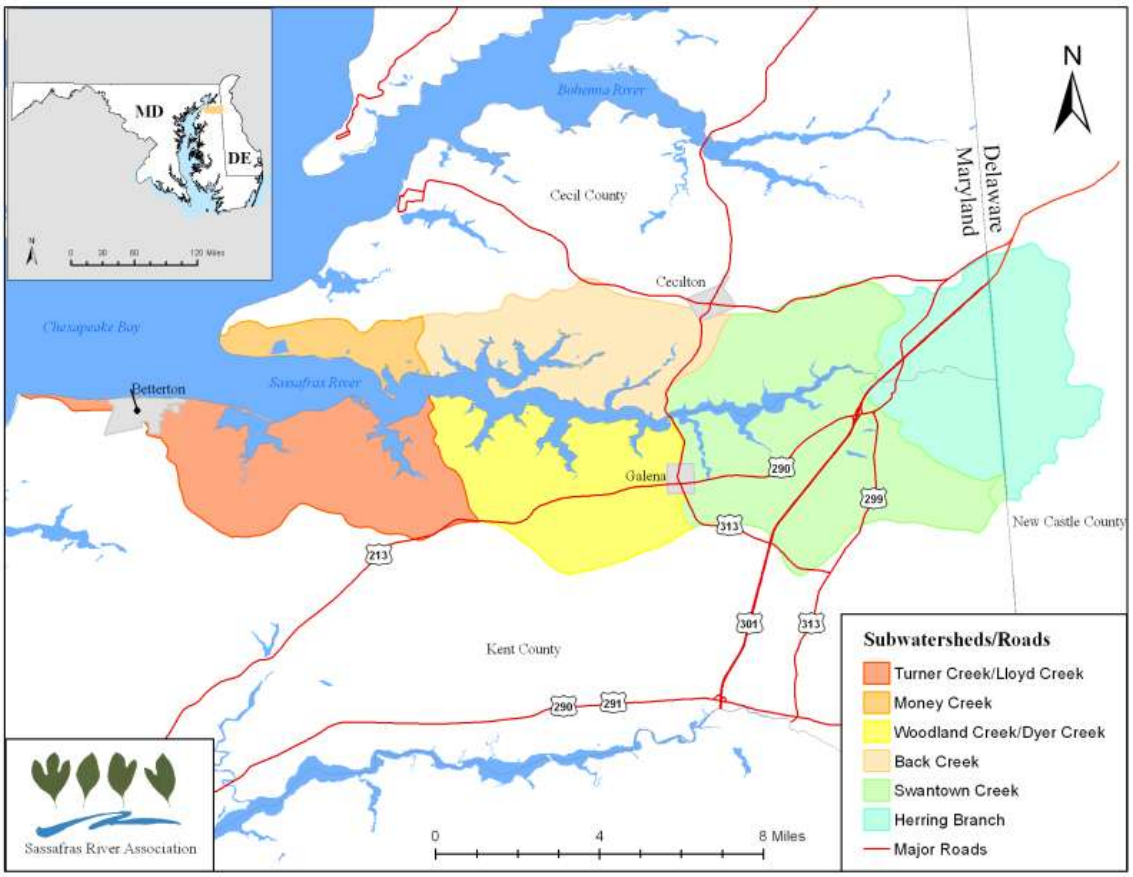
Location

The Sassafras River watershed encompasses 62,000 acres (96.9 mi^2) that drains portions of three counties in two States Kent County, MD (57%), Cecil County, MD (28%) and New Castle County, DE (8%) with 13% of the watershed being surface water. The 20.6 mile-long Sassafras River mainstem flows into the Chesapeake Bay. Impervious area covers 2.2% of the watershed. Land use in the watershed is: 57% agricultural; 24% forest; 4% developed; 14% water, and; 1% wetland.

Goal

The Sassafras River Watershed Action Plan (SWAP) was developed by the Sassafras River Association (SRA), a private nonprofit organization, in 2009. The Plan lists numerous goals to be achieved within 10 years.

Figure 14. The Sassafras River Watershed's Six Subwatershed Areas. (source: Sassafras Water Action Plan. Sassafras River Association in partnership with the Center for Watershed Projection. 2009. Page 3.)



Implementation in the Sassafras River Watershed

Most of the goals outlined in the Sassafras SWAP require significant preparatory work before implementation. In the past two years since EPA accepted the watershed plan, SRA has laid much of this ground work, which cannot be captured in load reduction totals. The Sassafras Summary table below lists Plan goals that have a measureable environmental outcome relating to nonpoint source management. Additionally, the SRA reports for 2011:

- Signed up 2,046 new acres of cover crops in the SRA cover crop bonus program in the Sassafras watershed, based on a rolling two year average of total acres enrolled.
- Held 6 community workshops focusing on building rain barrels, green landscaping and soil testing, and septic testing and BNR.
- Built approximately 45 rain barrels and conducted 46 soil tests in priority neighborhoods
- Conducted water testing, geotechnical analysis, survey work, and design for two major treatment wetlands downstream from CAFOs that will be fully constructed in 2012.
- Conducted survey and design for a 1600 linear ft regenerative stormwater project to repair severely eroding woodland gully
- Ordered prototype poultry manure injection unit for use in the Sassafras watershed in 2012, and laid ground work for conducting test plots with assistance from University of MD to determine effectiveness of the practice.
- Conducted about 25 tests on private septic systems in the critical area to determine condition and eligibility for upgrade.

Table 16. Sassafras River Watershed - 2011 Implementation Progress Summary

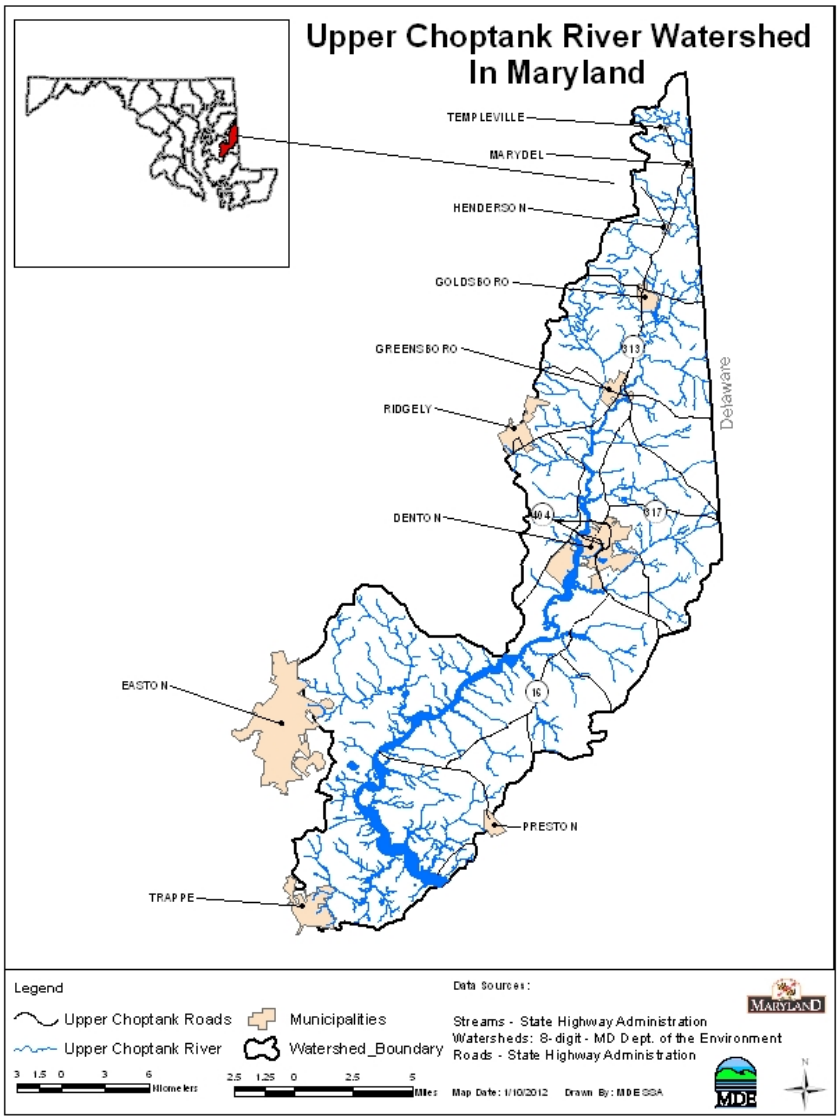
Goals			Progress					
			Implementation Progress (2)			Total Pollutant Reduction 2009-2011		
Goal Number and Name	Unit	Units Needed	2011	Previous Years (2009-10)	Percent of Goal Achieved	Nitrogen (lbs/yr)	Phosphorus (lbs/yr)	Sediment (tons/yr)
#1 Road retrofit, stream restored	project	3	0	0	0%	NR	NR	NR
#2 Stormwater retrofits	project	4	NR	1	25%	NR	NR	NR
#5 Septic system upgrades	project	150	NR	NR	0%	NR	NR	NR
#12 Stabilize eroding ravines	miles	1	0	0	0%	NR	NR	NR
#13 Stabilize eroding shoreline	miles	0.5	0	0	0%	NR	NR	NR
#14 Increase buffers (stream/shore)	miles	3	0	0	0%	NR	NR	NR
#17 Agricultural cover crops	acres/yr	5,000	NR	NR	0%	NR	NR	NR
#21 Wetland creation	projects	5	NR	1	20%	NR	NR	NR
#22 Agricultural BMPs	acres	500	NR	NR	0%	NR	NR	NR

1. 2011 = Calendar year. NA = not applicable. NR = not reported.
2. No 319(h) Grant funds have been directed to this watershed. Implementation using other funding sources may not be fully tracked or reported.
3. Implementation progress reported was tracked and reported by the Sassafras River Association.

9. Upper Choptank River

Location

The Upper Choptank River watershed encompasses 163,458 acres (255 mi^2) and drains portions of three Maryland counties (Caroline, Talbot and Queen Anne's Counties) as well as a portion of Delaware. The 20.6 mile-long Sassafras River mainstem flows into the Chesapeake Bay. Impervious area covers 2.2% of the watershed. Land use in the watershed is: 58% agricultural; 31% forest; 8% developed and; 3% water.



Goal

In the Upper Choptank River watershed plan, which was developed by Caroline County in 2010, the goal with a measureable water quality result is to reduce nonpoint source nutrient loads:

- Total nonpoint source nitrogen reduction: 704,000 pounds/year
- Total nonpoint source phosphorus reduction: 34,500 pounds/year

Implementation

Reporting of implementation to meet watershed plan goals since plan completion in 2010 includes two 319(h) Grant-funded projects as summarized on the next page.

Figure 15.
Left: Cover crops like that shown in this agricultural field are an important annual best management practice to implement as part of meeting nutrient reduction objectives in the Upper Choptank River watershed plan.

Table 17. Upper Choptank River Watershed Plan Implementation Progress Summary									
Categories (3)	**2011 Implementation**					**Previous Implementation 2010 (4)**			
	Units	**Count**	**Nitrogen (lb)**	**Phosphorus (lb)**	**Sediment (ton)**	**Projects**	**Nitrogen (lb)**	**Phosphorus (lb)**	**Sediment (ton)**
Agricultural Cover Crops	acres	NR	NR	NR	NR	NA	NA	NA	NA
Agricultural BMPs (all others)	# of BMPs	NR	NR	NR	NR	NR	23,456	2,498	NR
Urban BMPs (all)	# of BMPs	NR	NR	NR	NR	30	675	185	19
TOTAL Pollutant Reduction			0	0	0		24130.6	2683.2	19
					Watershed Plan Goal		704,000	34,500	
					Overall Total Pollutant Reduction		24,131	2,683	19
					Percent of Goal Achieved		3.4	7.8	

1. 2011 = Calendar year. NA = not applicable. NR = not reported. BMP = best management practice. 2. All 319(h) Grant-funded implementation is reported.

3. The Upper Choptank watershed plan has numberous BMP goals that are aggregated into the broad categories listed in this table. Implementation that does not involve 319(h) Grant funds may not be fully tracked or reported.

4. Previous implementation data was provided by Caroline County. The agricultural BMP data supersedes that reported in the 2010 Annual Report. The urban BMP data reported for previous implementation was not available at the time of the 2010 Annual Report.

Table 18. Upper Choptank River Watershed - 319(h) Grant Projects Funding Implementation							
Baltimore County Project Description (1)	**Grant Year Project # (2)**	**Grant Project Status**	**319(h) Funds (3)**	**Total Cost (4)**	**Estimated Load Reduction (5)**		
					Nitrogen (lb)	Phosphorus (lb)	Sediment (ton)
Caroline County DPW Stormwater Retrofit	FFY2010 #7	Construction	46,440	77,400	NR	NR	NR

(1) Implementation directly or indirectly supported by the 319(h) Grant. Excludes projects/costs for management oversight, monitoring, etc. Project prior to July 2009 are not presented.

(2) Additional information is available at http://iaspub.epa.gov/pls/grts/f?p=110:199:618139948454479 Select "Find Projects" and select "Maryland", grant year, project #.

(3) Closed projects = total 319(h) Grant funds expended for project. Other projects = 319(h) Grant allocated. Excludes match.

(4) Closed projects = reported total expenditure. Other projects = projected total cost.

(5) Closed projects = reported annual pollutant reduction. Other projects = projected future pollutant reduction.

V. Areas of Concern/Recommendations/Future Actions

Key challenges addressed by the NPS Program in collaboration with other state efforts include:

Urban/Suburban Nonpoint Source Pollution is increasing: Maryland has seen tremendous population growth over the last several decades and the trend is projected to continue. An accompanying trend is a decrease in the number of people per household. These trends contribute to increasing development acreage, increasing impervious area as a percentage of the landscape and a tendency for increasing urban stormwater runoff and the nonpoint source pollutant loads associated with it. The State has had two long-standing programs in place to control pollution generated from the development of land. The Maryland Department of the Environment (MDE) is responsible for administering these two programs that are erosion and sediment control and stormwater management. For over 40 years, Maryland's erosion and sediment control program has required that specific vegetated techniques and structural practices be implemented and plans be designed, reviewed, and approved to control runoff from construction sites. This statewide program has undergone numerous changes and improvements over the last four decades, the last of which occurred recently.

In January 2012, MDE completed a comprehensive two year process of modifying the regulations governing erosion and sediment control. This effort culminated in the adoption of the "2011 Standards and Specifications for Soil Erosion and Sediment Control" (Standards). These Standards improved the design of practices found in previous versions of the document (last edition dated 1994) and was based on current technology and experience and exhaustive public input from various development related communities. Accompanying the Standards were changes to the Code of Maryland Regulations (COMAR 26.17.01) that further improved construction site runoff management. Major improvements included limiting the amount of earth allowed to be disturbed for any project to 20 acres, and decreasing the time that soil is allowed to remain bare. Stabilization is now required to be applied within 3 days to site perimeters and controls and 7 days to inactive areas (previously 7 and 14 days, respectively).

The State's stormwater management program has also undergone numerous changes since it was first implemented in 1982. Recently however, MDE overhauled the way new development runoff is controlled by requiring the use of environmental site design (ESD). This represented a significant sea change in how stormwater management is to be designed. Prior to the passage of the Stormwater Act of 2007 (Act), Maryland allowed large, structural practices to be used to manage runoff from new and redevelopment projects. The Act mandated that MDE alter this approach in order to use ESD to better mimic natural hydrology.

Code Of Maryland Regulations (COMAR 26.17.02) modifications adopted in May 2009 now require better site planning, nonstructural techniques, and small-scale structures to be used to replicate the runoff characteristics of "woods in good condition" and reach a standard of maximum extent practicable (MEP). MEP is to be reached using alternative surfaces, green roofs, rainwater harvesting, rain gardens, micro-bioretention, and landscape infiltration. MDE revised Chapter 5 of the 2000 Maryland Stormwater Design Manual, provided guidance and ESD examples, and reviewed and approved all county and municipal stormwater management ordinances all in an effort to improve Maryland's program. Local implementation for private

development and MDE implementation for State and federal construction projects has been ongoing since May 2010.

Additional information related to urban/suburban nonpoint source pollutant control: http://mde.maryland.gov/programs/Water/StormwaterManagementProgram/SedimentandStormwaterHome/Pages/Programs/WaterPrograms/SedimentandStormwater/home/index.aspx

Another ongoing effort to improve NPS management in Maryland is State Agency input and assistance to local governments regarding their Comprehensive Plans, which are used by Counties to establish long term direction for their decisions regarding use of land, resources, etc. During 2009-2010 when local governments were working to integrate Water Resource Elements (WRE) into their Comprehensive Plans, MDE assisted by: 1) developing NPS analysis tools for use by local governments, 2) providing direct staff assistance in using these tools and in meeting NPS program objectives, and 3) reviewing and commenting on the local government's drafts. Now in continuing these efforts, MDE receives proposed changes to local Comprehensive Plans through the State's Clearing House Review process and offers recommendations and assistance designed to promote effective NPS management by local government.

Resource Constraints/Measurable Environmental Results: As federal and state budgets grow tighter, there is a push for all programs to demonstrate their effectiveness at producing results. The national Nonpoint Source Program is under pressure to demonstrate program effectiveness through measurable environmental results. Over the past two decades, the Maryland NPS Program has focused on a *targeted watershed* approach to help target resources in a way that would generate measurable results. Although the logic is compelling, findings of a retrospective assessment of results for the past two decades are not as compelling. Maryland's NPS Program, in coordination with EPA Region III, will evaluate the findings in a manner that has the greatest potential to generate measurable results. In coordination with EPA Region III, the NPS Program will selectively target program resources consistent with the following priorities:

Protection of high quality (Tier II) waters: The 319 Program is supporting implementation of Maryland's anti-degradation regulations by funding biological monitoring. This is being targeted to Tier II waters in which there are proposed development activities. This monitoring supports MDE decision-making and provides data to evaluate the effectiveness of the anti-degradation policies and support future policy refinements.

Biological Restoration Initiative: Maryland uses biological data from streams as one gauge of potential degraded conditions. If the percentage of degraded streams in a watershed exceeds a certain threshold, Maryland formally identifies that watershed on the State's list of impaired waters. Because watersheds that are just below the threshold of impairment may have a higher potential for restoration than those that are significantly more degraded, resources from the 319(h) NPS Program are being directed to these marginally impaired watersheds in an effort to remove them from the State's impaired waters list. The 319(h) Grant funding for this Biological Restoration Initiative (BRI) was coordinated in 2010 with the State's Chesapeake and Coastal Bays Trust Fund (Trust Fund) grant program trough the Trust Fund's targeting scheme. Coordination between Federal 319(h) Grant and the State Trust Fund will continue in 2012. It is anticipated that this coordination will assist in providing leveraging opportunities for funding in the future.

Reducing nutrient and sediment pollution to the Chesapeake Bay: Nutrient and sediment pollution are the main causes of impairment of our tidal waters. These pollutants have been the focus of EPA's development of TMDLs for the Chesapeake Bay. The 319 Program provided resources to support the development of Maryland's Phase I and Phase II Watershed Implementation Plans (WIP). In addition to this Chesapeake Bay restoration planning, the 319 Program is coordinating implementation grant proposals through Maryland's Trust Fund, which targets resources to areas with the greatest nutrient loading to the Bay and to the BRI target areas discussed above. As attention turns from WIP planning to tracking, reporting and validation of implementation the 319 Program will continue to play a vital role in refining and implementing these systems in coordination with the Chesapeake Bay Regulatory and Accountability Program (CBRAP) grant.

Improvement of Impaired Waters: Maryland has a two-track system for targeting resources to improving impaired waters. Both priority tracks are designed to address EPA's Strategic goals of improving living resources and showing observable water quality improvement. They also increase the likelihood of generating success stories discussed below.

One track is to identify waters with high recovery potential for removal from Maryland's 303(d) list. These waters tend to be impaired just slightly beyond the threshold of water quality standards or are conducive to restoration in other ways, e.g., the State has significant control over the sources of impairment. During 2009, MDE assessed the list of waters with biological impairment and ranked them to identify watersheds that have the highest potential for removal from Maryland's 303(d) list. Beginning in 2010, MDE integrated these priorities into the 319(h) grant selection criteria and into the State's criteria for dispersing Trust Fund grant. 319 grant funds were subsequently directed to field assessments of the causes of stream degradation and opportunities for remediation for several highly ranked waters.

Another example of this first track of priority attention is the continued 319 Program funding of acid mine drainage (AMD) restoration projects in Western Maryland. Because theses projects can be engineered to control sources of acidity, they have a high potential for meeting pH water quality criteria thereby resulting in their removal from Maryland's 303(d) list.

One challenge with this track is that soliciting implementation partners and directing funding to these types of projects must compete with the high-profile Chesapeake Bay restoration initiative. The 319 Program will make a concerted effort to balance resources in view of the dominant interest in Bay restoration.

The second track is to show incremental improvement in water quality short of removal from the 303(d) list. The waters prioritized for this objective tend to be intensely degraded with apparent low-cost opportunities for remediation. Due to the intense level of degradation, improvements tend to be more readily observable than cases of less degradation. A classic example of this is the situation of over grazing in or near streams, which cause multiple impacts including elevated bacteria, nutrients and sediments as well as physical stream degradation. Targeting these cases presents the opportunity to address multiple kinds of impairment with the same restoration actions. The 319 Program's pioneering use of the synoptic survey monitoring technique, which

collects numerous samples within a watershed, provides information at a fairly high resolution for use in both targeting and evaluation of progress in the future.

Documenting Success Stories: Maryland is committed to documenting NPS management & implementation success stories. A challenge in doing this is that site-specific environmental monitoring of NPS best management practice implementation documenting before/after change in terms of in water quality or in-stream biology improvement requires significant effort and investment. This investment is frequently not part of the BMP project itself. Commonly, generating sufficient monitoring documentation requires years of data collection in a local watershed where the environmental improvements produced by the BMPs are not obscured by weather variability and other sources of impairment. Additionally, long term monitoring before and after installation of BMPs has sometimes shown that environmental improvements in receiving streams may take years to appear due to environmental conditions like travel time through groundwater and effects of historic pollutant storage that can linger long after BMPs are installed. Consequently, it is difficult: 1) to identify partners who had initiated their success story monitoring years prior to BMP implementation, 2) to find adequate monitoring data/analysis to verify results, and 3) to assemble documentation that can survive critical technical review. The *Sligo Creek Success Story, Stream Restoration Reduces Peak Flow and Brings Back the Fish* presented in Appendix E met these challenges and was submitted to EPA in 2011.

To help meet these challenges in the future, MDE continues to seek out partners who volunteer to help generate success story documentation. Additionally, MDE is focusing a percentage of 319(h) Grant funded monitoring on generating monitoring data in watersheds with targeted NPS BMP implementation so that documentation for potential success stories can be developed.